

REMARKS

Claims 1-8 and 10-17 are currently pending in the present application, of which claim 9 has been canceled and claims 16-17 withdrawn pursuant to 37 CFR 1.142(b). Accordingly, claims 1-8 and 10-15 are under consideration.

Claims 1, 5, 10 and 14 have been amended to more distinctly claim the subject matter. In particular, claim 1 has been amended to recite that the cap layer is a dielectric and is formed in-situ after treating the exposed surfaces of the low k dielectric layer. Support for the amendment can be found, for example, on page 5, line 30 which describes a capping layer as a dielectric and on page 6, beginning on line 25 which describes embodiments of cap layers and their formation in-situ after treating the exposed surfaces of the low k dielectric layer. Claim 5 has been amended to recite the various examples of cap layer materials described in the application and claims 10 and 14 have been amended to depend on an active claim. Hence, it is respectfully submitted that these amendments are fully supported by the present application and do not add new matter to the application.

Objection to the Specification

The specification was also amended to include the serial numbers of applications that may contain related subject matter. Hence, reconsideration and withdrawal of the objection to the specification is respectfully solicited.

Further, it should be noted that these applications are currently pending in the Patent & Trademark Office. Applicant hereby brings these copending applications to the attention of the Examiner for his consideration.

Rejection under 35 USC 103

Claims 1-15 were rejected under 35 USC 103(a) as being unpatentable over Usami (US 6133137) in view of Mikagi (US 6153507). The rejection is traversed and it is respectfully submitted that the claims now in the application are patentable within the meaning of 35 USC 103(a).

Independent claim 1 is directed to a method of forming a composite dielectric on a semiconductor substrate. The method comprises forming a low k dielectric layer having an exposed surface on the substrate; treating the exposed surface of the dielectric layer with phosphine and/or a phosphine plasma; and forming a cap layer directly on the treated surface of the dielectric layer. The claim now requires that the cap layer is formed in-situ after treating the exposed surface of the dielectric layer and makes clear that the cap layer is a dielectric material and that the treated dielectric is a low k material. Claims 2-8 and 10-15 further define aspects of this method.

Neither cited reference alone or combined suggests the method of independent claim 1. Usami does not, at the very least, teach or suggest treating the surface of a dielectric layer with phosphine and/or a phosphine plasma and forming a cap layer directly on the treated surface of the dielectric layer. In fact, Usami shows the opposite. Usami treats side surfaces of a via hole and then fills the via with a conductive material rather than forming a cap dielectric layer. Moreover, Usami does not teach or suggest the step of forming a cap layer in-situ.

Mikagi does not cure the deficiencies of Usami. Mikagi does not describe forming a cap layer, in-situ, after treating the exposed surface of the dielectric layer.

In the Office Action, the Examiner asserted that Mikagi taught the feature of the in-situ step. Applicant respectfully disagrees. Mikagi is silent on this point. Silence can not be the basis of a teaching. Mikagi may suggest using similar processes in forming various dielectric layers. However, the fact that similar processes are described does not equate to the step of an in-situ process, let alone claim 1. This is particularly true with Mikagi. This reference in fact teaches the step of annealing a treated silicon dioxide layer (Col. 8, beginning at line 45). There is no indication that this step can occur such that a cap layer can be formed in-situ, let alone the method of claim 1 as a whole.

Hence it is respectfully submitted that the combination of the cited references do not suggest the claimed subject matter. Moreover, there has been no identification of the realistic motivation to modify the teachings of Usami with Mikagi to arrive at what is claimed.

Based upon the forgoing, it is respectfully submitted that the claims are patentable over the cited art. Reconsideration and allowance of the application are requested.

To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,



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